

Fisher® 2625 and 2625NS Volume Boosters

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Figure 1. Fisher 2625 Volume Booster



Introduction

Scope of Manual

This instruction manual provides installation, operation, maintenance, and parts information for Fisher 2625 and 2625NS volume boosters (figure 1). Refer to separate instruction manuals for information regarding the valve body, actuator, and other accessories.

Do not install, operate, or maintain a 2625 or 2625NS volume booster without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all of the contents of this manual, including all safety cautions and warnings. If you have any questions regarding these instructions contact your Emerson Process Management sales office before proceeding.

Description

The 2625 is certified for use in Safety Instrumented System (SIS) applications. Certification is by EXIDA Consulting LLC, a global provider of functional safety and control system security. SIS certification is identified on the product by the EXIDA logo on the 2625 nameplate.

The 2625 and 2625NS volume boosters are used in conjunction with a positioner on a throttling control valve to increase stroking speed. The booster has a fixed deadband (controlled by the seat-to-seat dimension of the supply and



exhaust plugs) which is factory set during assembly and testing. In addition, the booster incorporates soft-seat construction and an integral bypass restriction to eliminate positioner saturation problems that can occur with volume boosters that do not have these features. Adjustment of the integral bypass restriction is necessary for system stability. This adjustment does not affect the deadband of the booster, but does permit the control valve to respond to small input signal changes from the positioner without sacrificing steady-state accuracy.

It also allows the booster to deliver high-volume output for fast stroking when large, rapid input signal changes occur.

The volume booster is used to improve stroking speed. If precision valve control is required, the use of a positioner is recommended. If you use the volume booster only with an actuator, for on-off control, the integral bypass restriction on the volume booster must be closed (turned fully clockwise).

To facilitate diagnostic testing, you can install connectors and piping with each 2625 and 2625NS volume booster.

The 2625NS volume booster is designed for nuclear power applications. The 2625NS construction includes materials that provide superior performance at elevated temperature and radiation levels.

The O-rings in the 2625NS are EPDM (ethylene propylene) and the diaphragms are EPDM/meta-aramid. EPDM demonstrates superior temperature capability and shelf life over nitrile. The meta-aramid diaphragm fabric demonstrates improved strength retention at elevated temperature and radiation conditions.

CAUTION

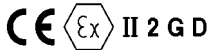
Use a clean, dry, oil-free air supply with instruments containing EPDM components. EPDM is subject to degradation when exposed to petroleum based lubricants.

Under the 10CFR50, Appendix B, quality assurance program, the 2625NS volume booster is qualified “commercial grade dedicated”. These can be supplied as 10CFR, Part 21 items.

Specifications

Specifications for the 2625 and 2625NS volume booster are listed in table 1. Information for an individual unit as it comes from the factory appears on the product nameplate.

Table 1. Specifications

<p>Port Diameters⁽¹⁾</p> <p>Supply Port: ■ 9.5 mm (0.375 inch) or ■ 12.7 mm (0.5 inch) Exhaust Port: ■ 2.4 mm (0.094 inch), ■ 9.5 mm (0.375 inch) or ■ 12.7 mm (0.5 inch)</p> <p>Input Signal</p> <p>Positioner output</p> <p>Maximum Input Signal Pressure</p> <p>10.3 bar (150 psig)</p> <p>Input to Output Pressure Ratio</p> <p>Fixed at 1 to 1</p> <p>Supply Pressure Ranges⁽²⁾</p> <p>When used in conjunction with a positioner or other pneumatic accessory, always pipe the positioner and booster with one common supply through a Fisher 67D, 67DR, or 95H regulator (see figure 2). A high-capacity filter, such as the Fisher 262K, should be installed in the supply line to the regulator. Supply pressure also must not exceed the maximum pressure rating of the actuator. Constructions are available in two maximum supply ranges.</p> <p>When Normally Used With Diaphragm Actuators: Up to 2.8 bar (40 psig) When Normally Used With Piston Actuators: Up to 10.3 bar (150 psig)</p> <p>Nominal Deadband⁽³⁾</p> <p>Percent of Positioner Output Span⁽⁴⁾: 2.4 mm (0.094 inch) exhaust port: 2% 9.5 mm (0.375 inch) exhaust port: 3.5% 12.7 mm (0.5 inch) exhaust port: 5%</p>	<p>Operative Temperature Limits^(2,3)</p> <p>2625: -40 to 71 °C (-40 to 160 °F) 2625NS: -40 to 93 °C (-40 to 200 °F)</p> <p>Maximum Flow Coefficients</p> <p>See table 2</p> <p>Connections</p> <p>Input Signal: 1/4 NPT Supply and Output Signal: 3/4 NPT</p> <p>Hazardous Area Classification</p> <p>Complies with the requirements of ATEX Group II Category 2 Gas and Dust</p> <p> II 2 G D</p> <p>Safety Instrumented System Classification</p> <p>SIL3 capable - certified by exida Consulting LLC</p> <p>Approximate Weight</p> <p>2.3 kg (5 pounds)</p> <p>Declaration of SEP</p> <p>Fisher Controls International LLC declares this product to be in compliance with Article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97 / 23 / EC. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.</p> <p>However, the product <i>may</i> bear the CE marking to indicate compliance with <i>other</i> applicable EC Directives.</p>
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1. May be used in any combination.

2. The pressure/temperature limits in this document, and any applicable code or standard limitation should not be exceeded.

3. This term defined in ISA Standard S51.1

4. Zero psig to maximum supply.

Educational Services

For information on available courses for 2625 and 2625NS volume boosters, as well as a variety of other products, contact:

Emerson Process Management
Educational Services - Registration
Phone: +1-641-754-3771 or +1-800-338-8158
e-mail: education@emerson.com
<http://www.emersonprocess.com/education>

Table 2. Maximum Flow Coefficients

PORT SIZE COMBINATIONS				SUPPLY PORT COEFFICIENTS	EXHAUST PORT COEFFICIENTS
Supply Port		Exhaust Port			
mm	Inch	mm	Inch	C _v	C _v
9.5	0.375	2.4	0.094	3.74	0.23
		9.5	0.375	3.74	2.29
		12.7	0.5	3.74	3.40
12.7	0.5	2.4	0.094	4.98	0.24
		9.5	0.375	4.98	2.30
		12.7	0.5	4.98	3.40
FIELDVUE™ DVC6200, DVC6200 SIS, DVC6200f, DVC6200p, DVC6000, DVC6000 SIS, DVC6000f digital valve controllers				0.37	0.31
FIELDVUE DVC2000 digital valve controller					
Low Pressure Relay				0.13	0.15
High Pressure Relay				0.19	0.20
Fisher 3570 valve positioner				0.25	0.25
Fisher 3582 valve positioner				0.17	0.19
Fisher 3610J, 3610JP, 3611JP, 3620J, 3620JP, 3621JP valve positioner				0.37	0.30

Installation

⚠ WARNING

Always wear protective clothing, gloves, and eyewear when performing any maintenance procedures to avoid personal injury.

System damage may result if a volume booster is installed in a way that it can be physically damaged.

Personal injury or system damage may result when service conditions exceed booster or other equipment ratings. Exceeding the pressure specifications in table 1 may cause leakage, parts damage, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Note

Do not use separate pressure supplies for the volume booster and associated positioner.

The volume booster may not exhaust immediately upon loss of a separate pressure supply. However, if the system is in a transient state at the time of pressure supply loss or if changes to the booster's input signal are sufficient to overcome the deadband, the booster will exhaust.

A loss of a pressure supply (either separate or common) to a 3582 or 3610J positioner will cause the positioner's output pressure (booster's input pressure) to decay.

Always pipe the positioner and the volume booster with one common supply. See figure 2 for typical installation examples. A 67D, 67DR, or 95H regulator is required to provide sufficient capacity to supply both components. A high-capacity filter, such as the 262K, should be installed in the supply line to the 67D, 67DR, or 95H regulator.

Mounting

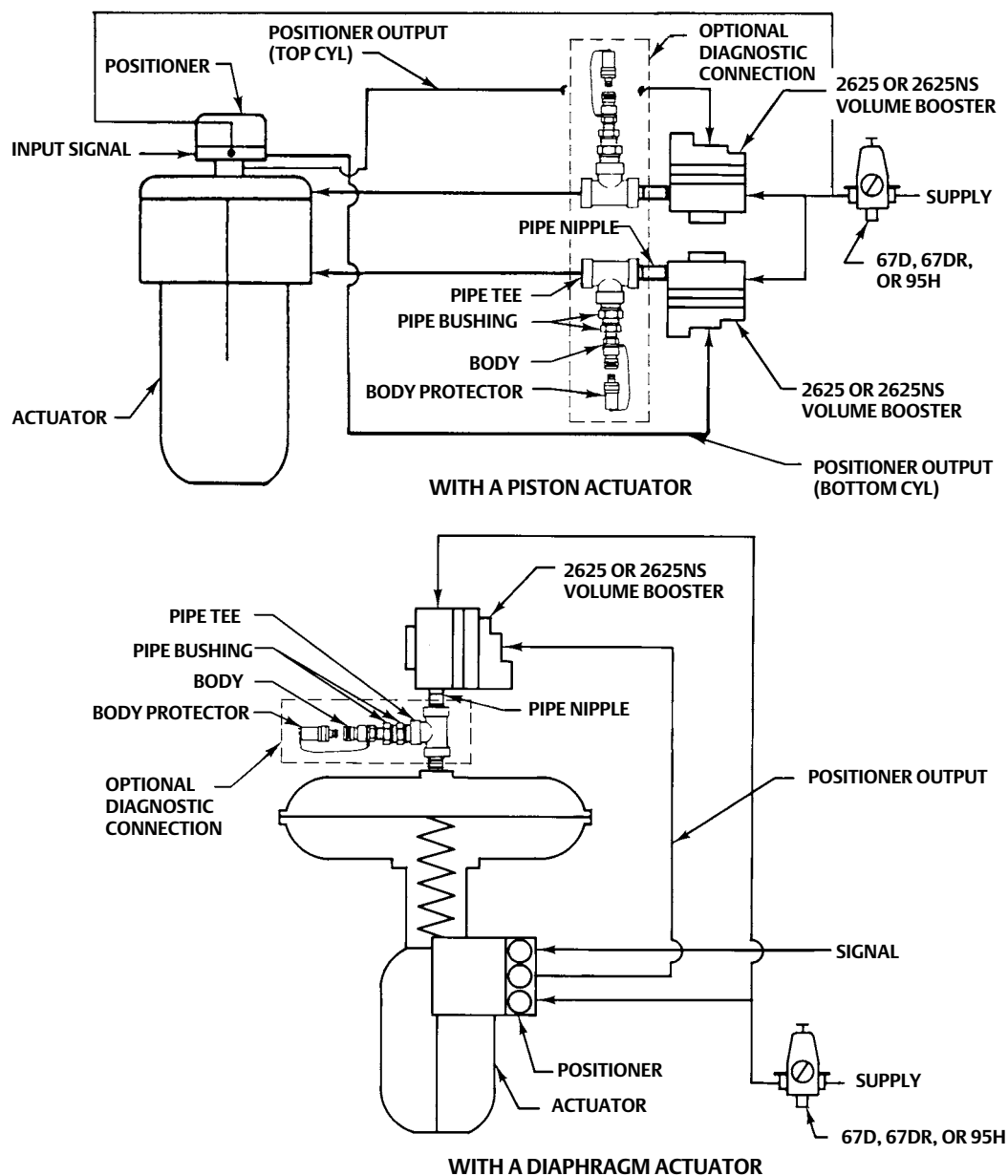
The volume booster is typically nipple-mounted between the pneumatic supply source and the actuator, and may be used with piston or diaphragm actuators. Many actuators require larger casing or cylinder connections and modifications to allow the booster to deliver the higher volume output.

The booster may also be directly mounted to the actuator by using an actuator yoke mounting bracket (see figure 5) or casing mounting bracket.

Pressure Connections

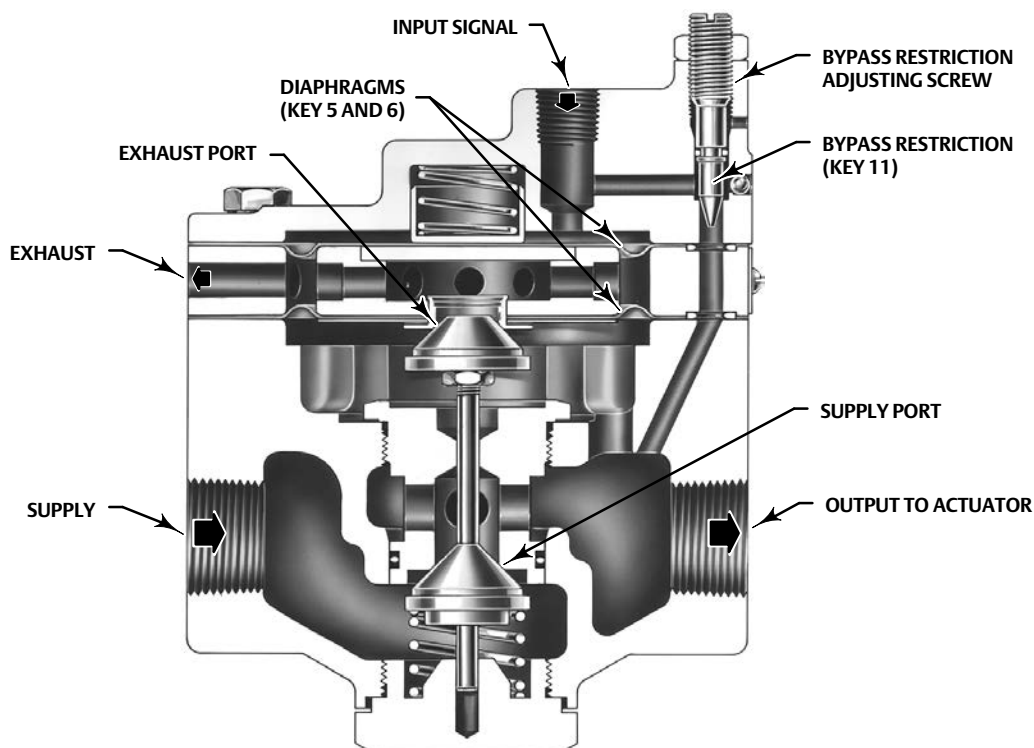
The input signal connection is 1/4 NPT. The supply and output connections are 3/4 NPT (minimum pipe size recommended for nipple mounting is 1/2 NPT). Connections to the volume booster should be made as indicated in figure 3. Connections for two typical applications are shown in figure 2. Ensure that the piping is of proper size to meet the capacity demands of the booster and that you equip the actuator with properly sized input connections.

Figure 2. Typical Installations



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Figure 3. Volume Booster Sectional View



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Diagnostic Connections

To support diagnostic testing of valve/actuator/positioner packages, install connectors and hardware between the 2625 or 2625NS volume booster and the actuator. Typical connector installations are shown in figure 2.

The hardware used includes a 3/4 NPT pipe nipple, pipe tee, and pipe bushings with an 1/8 NPT pipe bushing for the connector. The connector consists of an 1/8 NPT body and body protector.

See separate instructions for diagnostic connections to the positioner.

Supply Pressure

Supply pressure must be clean dry air or noncorrosive gas, and it should be filtered.

CAUTION

Use a clean, dry, oil-free air supply with instruments containing EPDM components. EPDM is subject to degradation when exposed to petroleum based lubricants.

⚠ WARNING

If a flammable or hazardous gas is to be used as the supply pressure medium, personal injury, property damage or equipment damage could result from fire or explosion of accumulated gas or from contact with hazardous gas. The volume booster has no provision for piping away the vented exhaust gas. Therefore, do not use flammable or otherwise hazardous gas as a supply medium unless the unit is in a well-ventilated area and all ignition sources have been removed.

Exhaust Ports

Exhaust to the atmosphere is through exhaust ports in the side of the unit. Keep the exhaust ports free of any obstructions or foreign materials that might clog them.

Operating Information

The only operating requirement of the volume booster is the adjustment of the bypass restriction for stable actuator performance. Although systems with different characteristics may require different adjusting techniques, the following adjustment procedure is recommended when using the actuator for throttling control.

Note

When sizing the booster, select the lowest C_g that will meet the stroking speed specifications. Oversizing the booster in a closed loop may lead to stability problems, thus requiring the bypass to be opened so far that the booster will never operate.

Prior to operation, turn the bypass restriction adjusting screw (figure 3) four or five turns counterclockwise from the fully closed position. With the actuator in operation, slowly turn the restriction clockwise until the booster operates in response to large changes in the input signal, yet allows small changes to move the actuator without initiating booster operation.

If the actuator is to be used for on-off control, the restriction should be closed (turned fully clockwise).

Principle of Operation

Refer to figures 2 and 3.

Because of the restriction, large input signal changes register on the booster input diaphragm sooner than in the actuator. A large, sudden change in the input signal causes a pressure differential to exist between the input signal and the output of the booster. When this occurs, the diaphragms move to open either the supply port or the exhaust port, whichever action is required to reduce the pressure differential. The port remains open until the difference between the booster input and output pressures returns to within the deadband limits of the booster. With the bypass restriction adjusted for stable operation, signals having small magnitude and rate changes pass through the bypass restriction and into the actuator without initiating booster operation. Both the supply and exhaust ports remain closed, preventing unnecessary air consumption and possible saturation of positioner relays.

Maintenance

⚠ WARNING

Always wear protective clothing, gloves, and eyewear when performing any maintenance procedures to avoid personal injury.

Maintenance requires taking the volume booster out of service periodically. To avoid personal injury or equipment damage, disconnect or bypass any pressure lines to the booster, and vent any pressure locked in the unit before you begin maintenance.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Diaphragm Assembly Replacement

Key numbers refer to figure 4.

- 1 . Remove the six cap screws (key 15) from the perimeter of the spring case assembly (key 3), and lift off the assembly, taking care you do not lose the input spring (key 8) or the spring seat (key 9).
- 2 . Remove the upper diaphragm (key 6), diaphragm spacer (key 2), diaphragm assembly (key 5), (which includes the lower diaphragm), and the O-rings (key 14). Inspect these parts for damage and replace if necessary.
- 3 . Replace the O-rings (key 14) after coating with lubricant (key 21). Then replace the diaphragm assembly (key 5), diaphragm spacer (key 2), and the upper diaphragm (key 6).

Note

To ensure proper operation of the bypass restriction, make certain that the holes in the diaphragm and the bypass restriction are in line with the holes in the diaphragm spacer (key 2).

- 4 . Install the spring case assembly (key 3) on the upper diaphragm (key 6). Make sure the spring seat (key 9) and the upper spring (key 8) are installed in the spring case assembly (key 3). Press on the bottom of the spring seat with your finger. If the spring seat (key 9) does not move freely in the spring case assembly (key 3), remove the spring seat (key 9), and apply lubricant (key 23). Reinstall the spring seat (key 9) in the spring case assembly (key 3).

CAUTION

To avoid damage to the diaphragms, do not overtighten the screws.

- 5 . Replace the six cap screws (key 15) and tighten them in a crisscross manner.

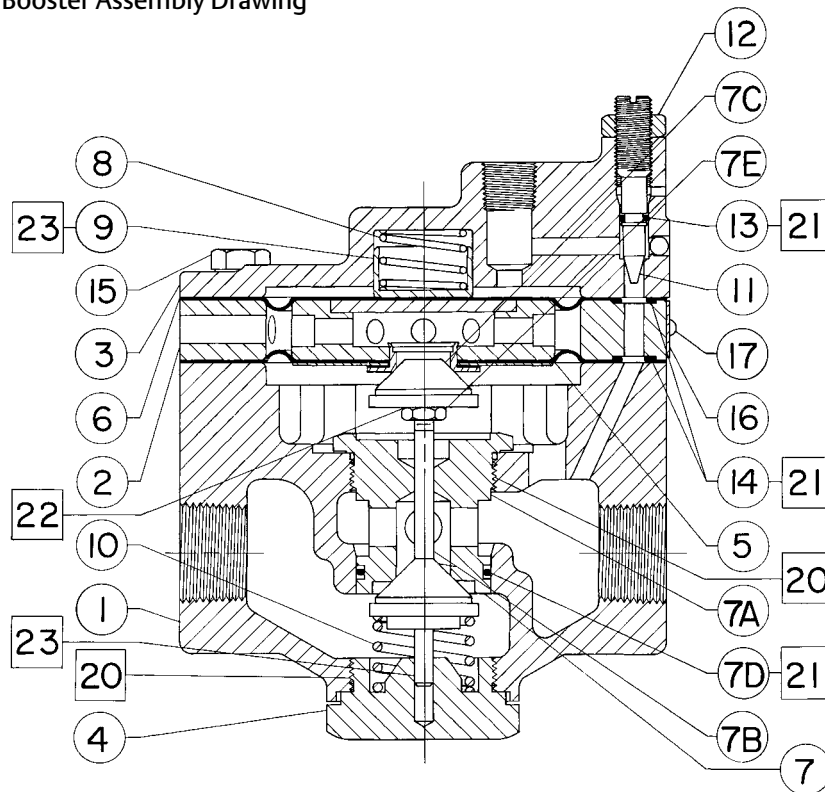
Valve Assembly Replacement

CAUTION

The distance between the exhaust port seat line on the upper valve (key 7C) and the supply port seat line on the lower valve and stem (key 7B) is critical to ensure the deadband requirements of the volume booster. This distance must be adjusted in accordance with the following steps before you replace the valve assembly (key 7), or the upper valve (key 7C), and lower valve and stem (key 7B).

For key numbers refer to figure 4.

Figure 4. Volume Booster Assembly Drawing



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- 1 . Remove the six cap screws (key 15) from the perimeter of the spring case assembly (key 3) and lift off the assembly, taking care you do not lose the upper spring (key 8) or the spring seat (key 9).
- 2 . Remove the upper diaphragm (key 6), the diaphragm spacer (key 2), the diaphragm assembly (key 5), (which includes the lower diaphragm), and the O-rings (key 14).
- 3 . Unscrew the valve assembly (key 7) from the body. The seat ring (key 7A) has a 1-1/2 inch hex for removal.
- 4 . Apply lubricant (key 21) to the O-ring (key 7D), lubricant (key 23) to the lower valve and stem (key 7B), and sealant (key 20) to the thread of the seat ring (key 7A).
- 5 . Install the valve assembly (key 7) into the body (key 1)—making sure the lower valve and stem (key 7B) engages over the lower spring (key 10)—and into the bottom plug (key 4).

- 6 . Install the diaphragm assembly (key 5) onto the upper valve (key 7C).
- 7 . Install the diaphragm spacer (key 2) onto the body (key 1).
- 8 . Place a straight edge at least 5 inches (127 mm) long across the diaphragm spacer (key 2). The upper surface of the diaphragm assembly (key 5) should coincide with the upper surface of the diaphragm spacer (key 2). If not, loosen the hex nut (key 7E) and raise or lower the upper valve (key 7C) accordingly. Remove the valve assembly (key 7) to loosen the hex nut (key 7E).
- 9 . Repeat steps 4 through 8 until the upper surface of the diaphragm assembly (key 5) coincides with the upper surface of the diaphragm spacer (key 2).

Note

To ensure proper operation of the bypass restriction, make certain that the holes in the diaphragm and the bypass restriction are in line with the holes in the diaphragm spacer (key 2).

- 10 . Make sure the O-rings (key 14) are installed in the diaphragm spacer (key 2) and coated with lubricant (key 21).
- 11 . Install the upper diaphragm (key 6).
- 12 . Install the spring case assembly (key 3) on the upper diaphragm (key 6). Make sure the spring seat (key 9) and upper spring (key 8) are installed in the spring case assembly. Press on the bottom of the spring seat with your finger. If the spring seat does not move freely in the spring case assembly, remove the spring seat, apply lubricant (key 23), and reinstall in the spring case assembly.

CAUTION

To avoid damage to the diaphragms, do not overtighten the screws.

- 13 . Replace the six cap screws (key 15) and tighten them in a crisscross manner.

Installation of Diagnostic Connections

See figure 2 for part names and order of installation.

- 1 . Before you assemble the pipe nipple, pipe tee, pipe bushings, actuator piping, and connector body, apply sealant to all threads.
- 2 . Turn the pipe tee to position the connector body and body protector for easy access when doing diagnostic testing.

Parts Ordering

Whenever corresponding with your Emerson Process Management sales office about this equipment, mention the serial number of the volume booster. This serial number can be found on the nameplate (key 16, figure 4).

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher instrument. The use of components not manufactured by Emerson Process Management may void your warranty, might adversely affect the performance of the instrument, and could cause personal injury and property damage.

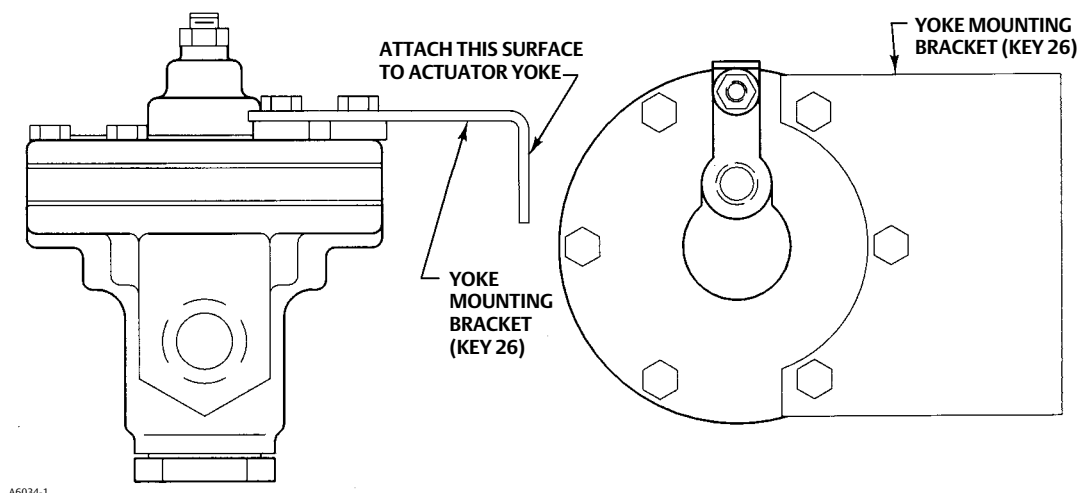
Parts Kits

Description	Part Number	Key	Description
Repair kits for diaphragms (for 2625 only) [Kit contains keys 5, 6, 13, 14] For boosters with 3/32 inch exhaust For boosters with 3/8 inch exhaust For boosters with 1/2 inch exhaust	R2625D33212 R2625D38012 R2625D12012	6*	Upper Diaphragm For 2625, nitrile on nylon For 2625NS, EPDM/meta-aramid
Repair kits for valve assemblies (for 2625 only) [Kit contains key 7] For boosters with 3/8 inch supply For boosters with 1/2 inch supply	R2625V38012 R2625V12012	7*	Valve Assembly, (includes keys 7A, 7B, 7C, 7D, and 7E) For 2625, Brass/nitrile 9.5 mm (0.375 inch) supply port 12.7 mm (0.5 inch) supply port For 2625NS 9.5 mm (0.375 inch) supply port 12.7 mm (0.5 inch) supply port

Parts List (figure 4)

Key	Description	Key	Description
1	Body, Aluminum	7C*	Upper Valve For 2625, Aluminum/nitrile For 2625NS
2	Diaphragm Spacer Aluminum Aluminum with 1/2 NPT vent connection	7D*	Valve O-Ring For 2625, nitrile For 2625NS, EPDM
3	Spring Case Assembly, Aluminum/heat-treated 440 stainless steel	7E	Hex Nut, steel pl
4	Body Cap Brass 316 SST	8	Upper Spring, steel pl For 2.8 bar (40 psig) max. supply pressure For 10.3 bar (150 psig) max. supply pressure
5*	Diaphragm Assembly For 2625 Nitrile on nylon diaphragm With brass blocked exhaust With brass 2.4mm (0.094 inch) exhaust With brass 9.5mm (0.375 inch) exhaust With brass 12.7mm (0.5 inch) exhaust For 2625NS EPDM/meta-aramid, With 9.5 mm (0.375 inch) exhaust With 12.7 mm (0.5 inch) exhaust	9	Spring Seat, SST
		10	Lower Spring, steel pl For 2.8 bar (40 psig) max. supply pressure For 10.3 bar (150 psig) max. supply pressure
		11	Restriction, SST
		12	Hex Nut, steel pl

Figure 5. Volume Booster with Yoke Mounting Bracket



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Key	Description	Key	Description
13*	O-Ring For 2625NS, EPDM For 2625, nitrile	26	Mounting Bracket For yoke mounting (see figure 5) For casing mounting (Use two brackets, stacked, for seismic mounting)
14*	O-Ring (2 req'd) For 2625, nitrile For 2625NS, EPDM		
15	Cap Screw, steel pl (6 req'd) Standard With 1/2 NPT vent connection		
16	Nameplate, stainless steel		
17	Drive Screw, stainless steel (2 req'd)		
20	Anti-seize sealant		
21	Lubricant, silicone sealant		
22	Thread locking adhesive, mild strength		
23	PTFE petroleum-based lubricant (see note immediately below)		

Note

PTFE petroleum-based lubricant is only for use with 2625. For 2625NS use a medium grade silicone-based lubricant.

Diagnostic Connections

FlowScanner™ diagnostic system hook-up
Includes pipe tee, pipe nipple, pipe bushings, connector body, and body protector.

For diaphragm actuator
SST fittings
Brass fittings
For piston actuator
SST fittings
Brass fittings

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